



WHAT IS LIFE?

INTRODUCTION TO CLASSIFICATION

The Characteristics of Living Things

All living things have a cellular organization, contain similar chemicals, use energy, respond to their surroundings, grow and develop, and reproduce.



Cellular Organization



A **cell** is the basic unit of structure and function in an organism. The smallest cells are so tiny that you could fit more than a million of them on the period at the end of this sentence.

To see most cells, you need a **microscope**, a tool that uses lenses to magnify small objects.

Organisms may be composed of only one cell or of many cells.

Unicellular, or single-celled organisms, include bacteria, the most numerous organisms on the planet.

A bacterial cell carries out all of the functions necessary for the organism to stay alive.





Multicellular organisms are composed of many cells. In many multicellular organisms, the cells are specialized to do certain tasks.

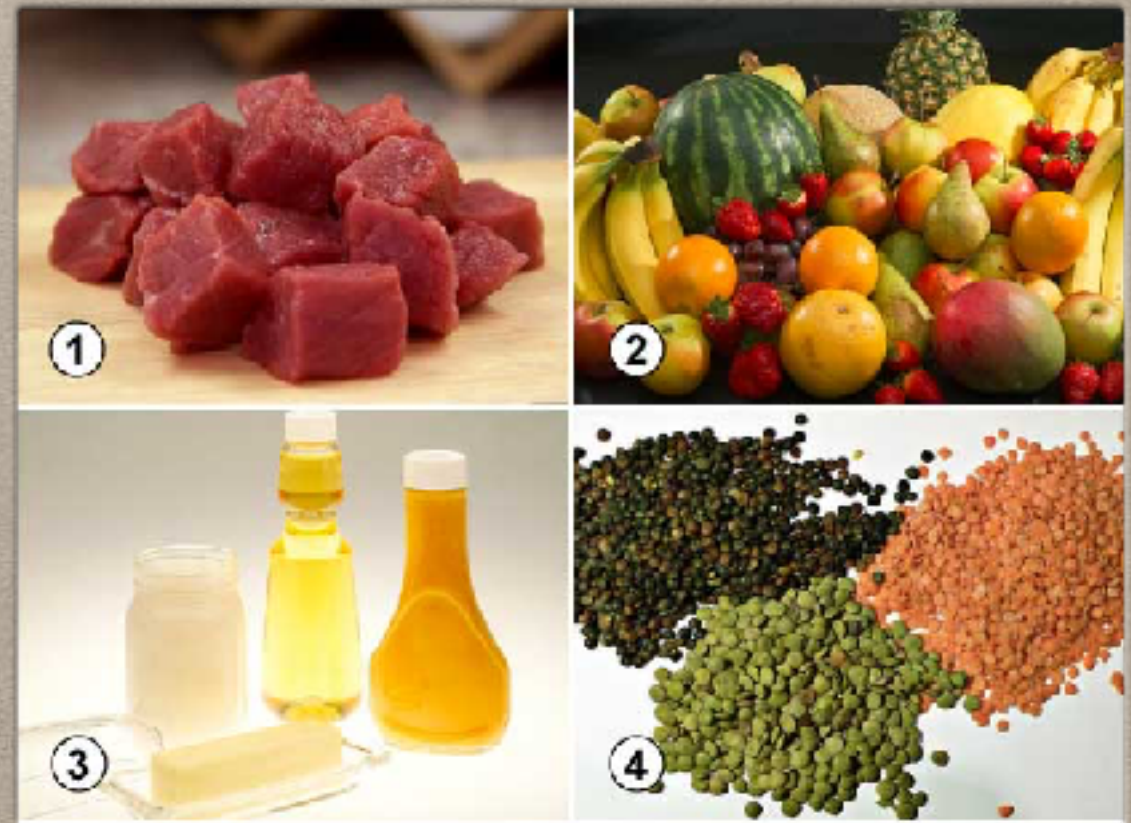
For example, you are made of trillions of cells. Specialized cells, such as your muscle and nerve cells, work together to keep you alive.

Nerve cells carry messages about your surroundings to your brain. Other nerve cells then carry messages to your muscle cells, making your body move.

The Chemicals of Life

The cells of all living things are composed of chemicals. The most abundant chemical is water. Other chemicals, called carbohydrates, are a cell's main source of energy.

Two other chemicals, proteins and lipids, are the building materials of cells. Nucleic acids are the genetic material - the chemical instructions that direct the cell's activities.



Energy Use



The cells of organisms use energy to do what living things must do, such as grow and repair injured parts. An organism's cells are always hard at work. For example, as you read this paragraph, not only are your eye and brain cells busy, but most of your cells are working too.

The cells of your stomach and intestine are digesting food. Your blood cells are moving chemicals around your body. If you've hurt yourself, some of your cells are repairing the damage.

Response to Surroundings

If you have ever seen a plant in a sunny window, you may have observed that the plant's stems have bent so that the leaves face the sun.

Like a plant bending toward the light, all organisms react to changes in their environment. A change in an organism's surroundings that causes the organism to react is called a **stimulus**.





Stimuli include changes in temperature, light, sound, and other factors. An organism reacts to a stimulus with a **response** - an action or change in behavior.

For example, has someone ever knocked over a glass of water by accident during dinner, causing you to jump? The sudden spilling of water was the stimulus that caused your response to jump.

Growth and Development

Growth is the process of becoming larger.

Development is the process of change that occurs during an organism's life to produce a more complex organism. To grow and develop, organisms use energy to create new cells.



Reproduction

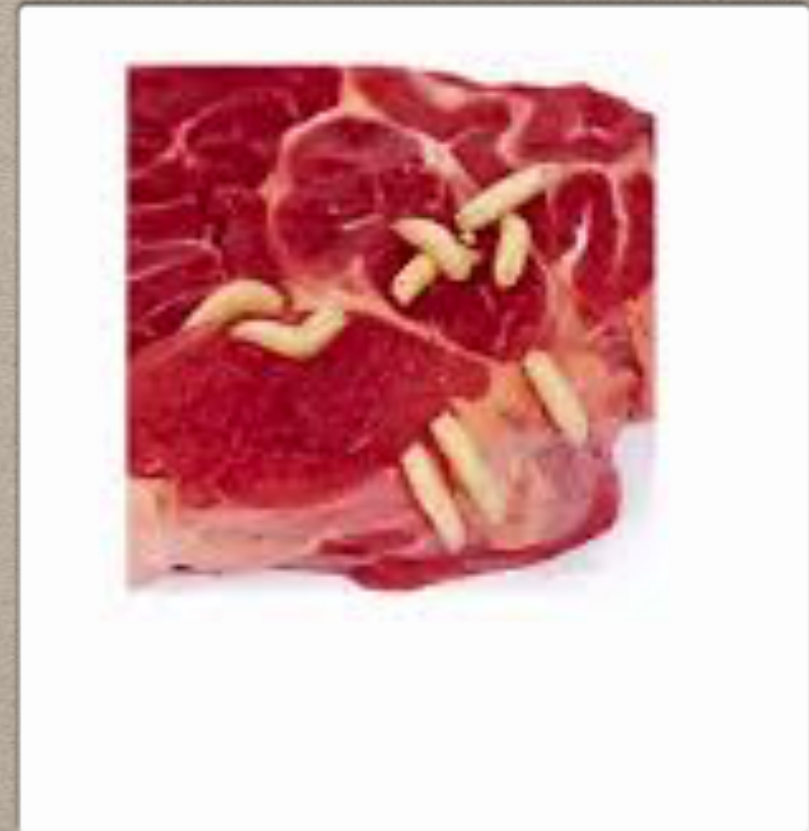


Reproduction is the process of producing offspring that are similar to the parents. Robins lay eggs that develop into young robins that closely resemble their parents.

Life Comes from Life

Living things arise from living things through reproduction. Four hundred years ago, however, people believed that life could appear from nonliving material.

For example, when people saw flies swarming around decaying meat, they concluded that flies could arise from rotting meat. The mistaken idea that living things can arise from nonliving sources is called **spontaneous generation**.



It took hundreds of years of experiments to convince people that spontaneous generation does not occur.

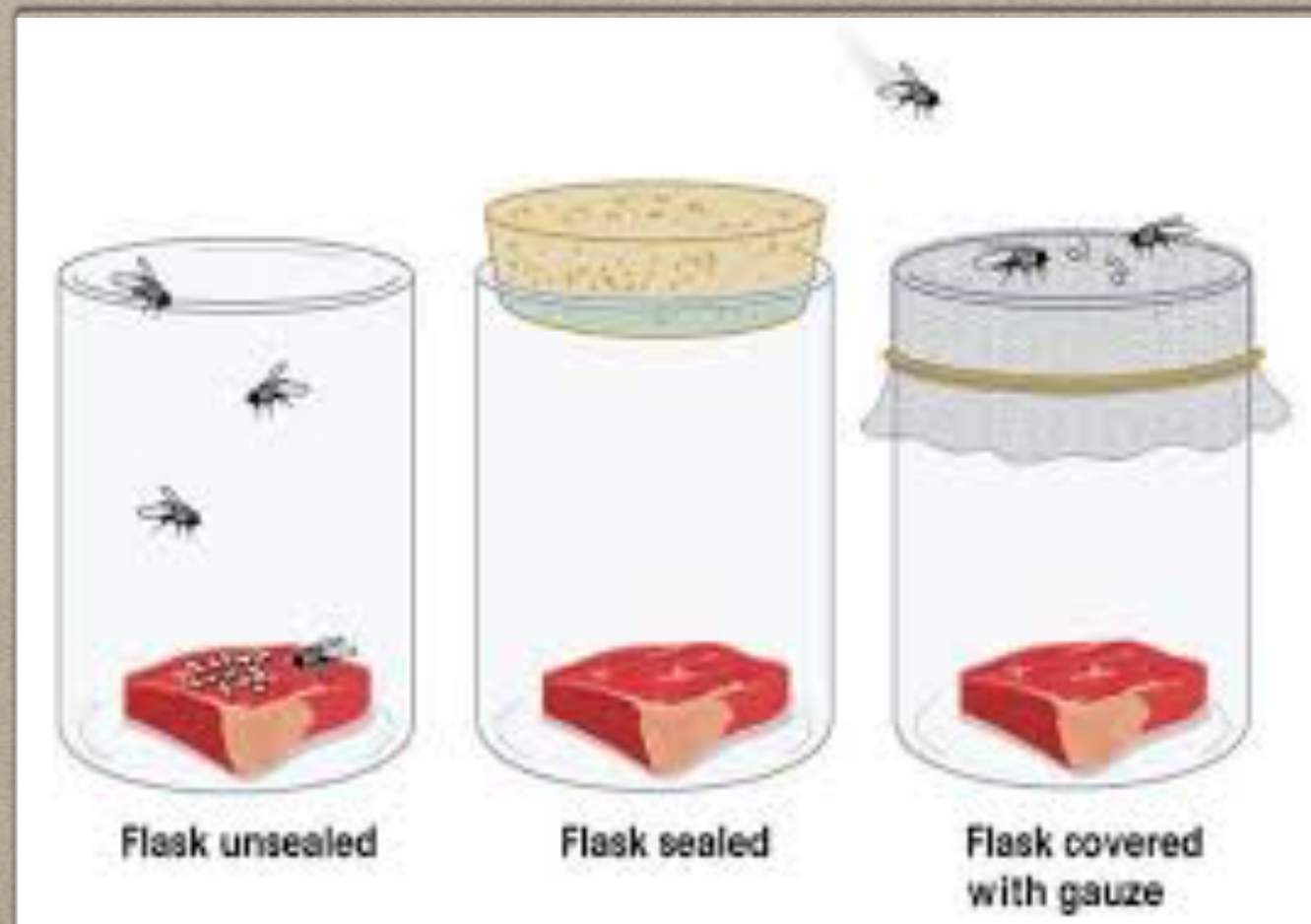
Redi's Experiment



In the 1600's, an Italian doctor named Francesco Redi helped to disprove spontaneous generation. Redi designed a controlled experiment to show that flies do not arise from decaying meat.

In a controlled experiment, a scientist carries out two tests that are identical in every respect except for one factor. The one factor that a scientist changes is called the manipulative variable.

In Redi's experiment, the manipulated variable was whether or not the jar was covered. Flies were able to enter the uncovered jar and lay their eggs on the meat inside. These eggs hatched into maggots, which developed into new flies. The flies could not enter the covered jar, however.



Therefore, no maggots formed on the meat in the covered jar. Through his experiment, Redi was able to conclude that rotting meat does not produce flies.

Pasteur's Experiment



In the mid-1800's, the French chemist Louis Pasteur designed some controlled experiments that finally rejected spontaneous generation.

Pasteur demonstrated that new bacteria in broth only appeared when they were produced by existing bacteria.

The experiments of Redi and Pasteur helped to convince people that living things do not arise from nonliving things.

The Needs of Living Things

All living things must satisfy their basic needs for food, water, living space, and stable internal conditions.

Food

Recall that organisms need a source of energy to live. Organisms that make their own food are called **autotrophs**. Organisms that cannot make their own food are called **heterotrophs**. A heterotroph's energy source can be another organism, or the sun in an indirect way, if they eat an autotroph.



Water



All living things need water to survive. Most living things can only live a few days without water. Organisms need water to obtain chemicals from their surroundings, break down food, grow, move substances within their bodies, and reproduce.

One property of water that is vital to living things is its ability to dissolve more chemicals than any other substance on Earth.

Water makes up 90% of the liquid part of your blood. The food that your cells need dissolves in blood and is transported to all parts of your body.

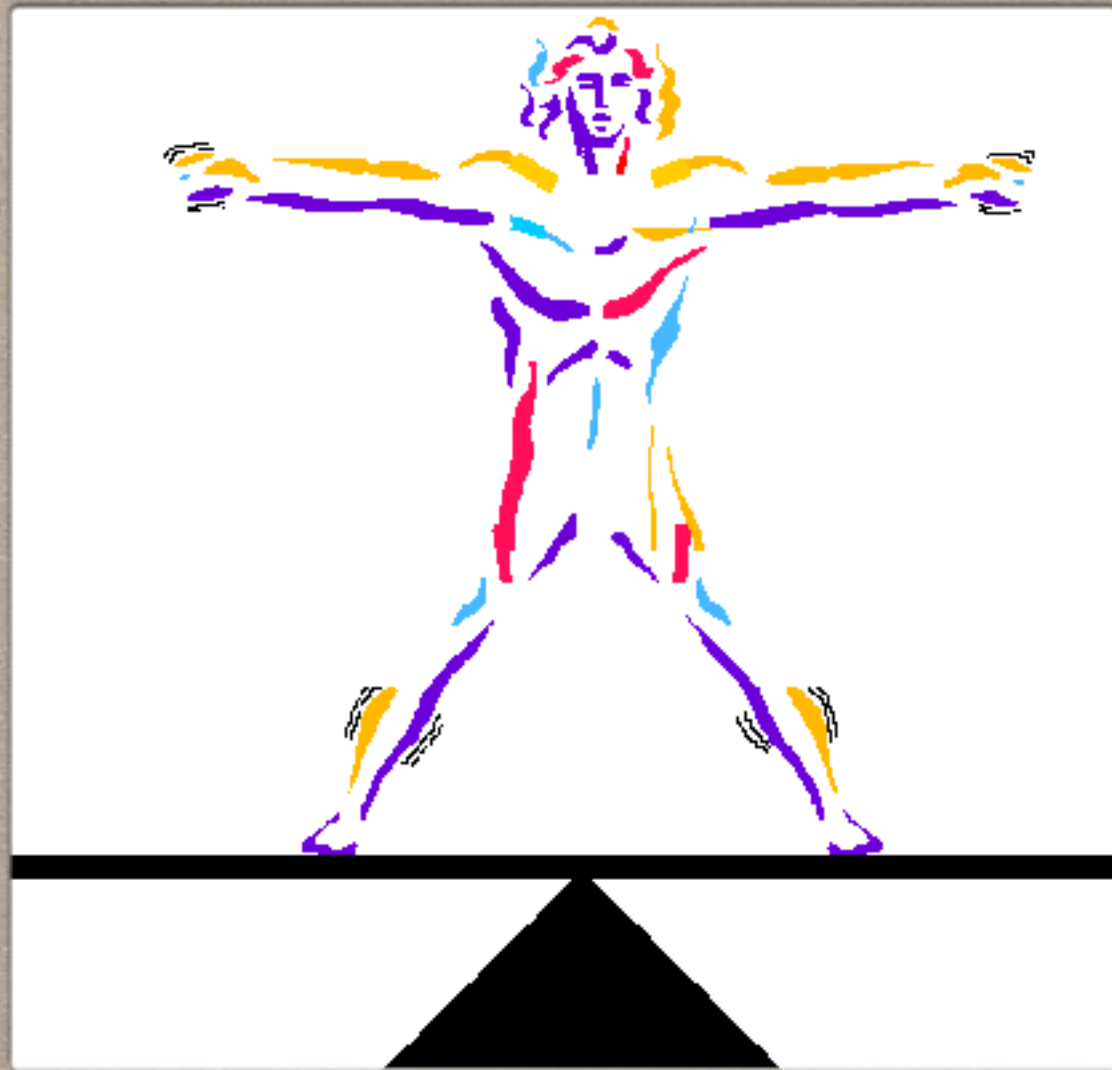
Waste from cells dissolves in blood and is carried away. Your body's cells also provide a watery environment in which chemicals are dissolved.

Living Space

All living things need a place to live to get food and shelter. It's surroundings provide what it needs to survive.



Stable Internal Conditions



Organisms must be able to keep the conditions inside their bodies stable, even when conditions in their surroundings change significantly. The maintenance of stable internal conditions is called **homeostasis**.

Homeostasis keeps internal conditions just right for cells to function. Think about your need for water after a hard workout. When water levels in your body decrease, chemicals in your body send signals to your brain, causing you to feel thirsty.

KEYWORDS: ENGLISH - SPANISH

Cell - Celda

Stimulus - Estímulo

Microscope - Microscopio

Response - Respuesta

Autotroph - Autotroph

Development - Desarrollo

Heterotroph - Heterotroph

Reproduction - Reproducción

Multicellular - Multicelular

Homeostasis - Homeostasis

Unicellular - Unicelular

Spontaneous Generation - Generación Spontaneous